Health and Safety Plan for the Operable Unit 7-13/14 Integrated Probing Project

1. INTRODUCTION

This health and safety plan (HASP) establishes the procedures and requirements that will be used to eliminate or minimize health and safety hazards to persons conducting Operable Unit (OU) **7-13/14** integrated probing project tasks at the Radioactive Waste Management Complex (RWMC) Subsurface Disposal Area (SDA). Probes are being installed and sampled to gather data in support of the OU **7-13/14** remedial investigation/feasibility study (RI/FS).

This HASP meets the requirements of the Occupational Safety and Health Administration (OSHA) standard, **29** Code of Federal Regulations (CFR) **1910.120/1926.65**, "Hazardous Waste Operations and Emergency Response (HAZWOPER)." Its preparation is consistent with information found in the National Institute of Occupational Safety and Health (NIOSH)/OSHA/United States Coast Guard/Environmental Protection Agency (EPA) ***Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*** (NIOSH **1985);** Idaho National Engineering and Environmental Laboratory (INEEL) safety and health manuals; INEEL ***Emergency Plan/Resource Conservation and Recovery Act (RCRA) Contingency Plan*** (42 USC **§ 6901** et seq.); and INEEL radiological control and radiological protection procedures.

A safety assessment for the OU **7-13/14** integrated probing activities has been written to evaluate potential accident and consequence scenarios, and OU **7-13/14** integrated probing activities addressed in this HASP have been evaluated through the unreviewed safety question safety evaluation screening process as defined in the ***Radioactive Waste Management Complex Safety Analysis Report (SAR)*** (INEEL 2000a). Accordingly, probing activities fall within the RWMC safety authorization basis (the RWMC ***SAR)*** as defined by the United States Department of Energy (DOE) Order **5480.23,** "Nuclear Safety Analysis Reports."

This HASP governs all work performed at OU **7-13/14** probing task sites that are performed by employees of Bechtel BWXT Idaho, LLC (BBWI), subcontractors to the BBWI, and other personnel who perform specific activities in support of the project at the OU **7-13/14** project locations. This HASP has been reviewed and approved by the OU **7-13/14** health and safety officer (HSO) in conjunction with the field team leader (FTL), project manager (PM), and necessary Environmental Restoration (ER) and RWMC environmental, safety, health, and quality professionals to ensure the effectiveness and suitability of this HASP for probing activities.

1.1 Idaho National Engineering and Environmental Laboratory Site Description

The INEEL, formerly the National Reactor Testing Station (NRTS), encompasses **2,305 km^2** (**890** mi^2), and is located approximately **58 km (34 mi)** west of Idaho Falls, Idaho (see Figure **1-1**). The United States Atomic Energy Commission, now the DOE, established the NRTS in **1949** as a site for the building and testing of a variety of nuclear facilities. The INEEL has also been the storage facility for transuranic (TRU) radionuclides and low-level radioactive waste (LLRW) since **1952.** At present, the INEEL supports the engineering and operations efforts of DOE and other federal agencies in areas of nuclear safety research, reactor development, reactor operations and training, nuclear defense materials

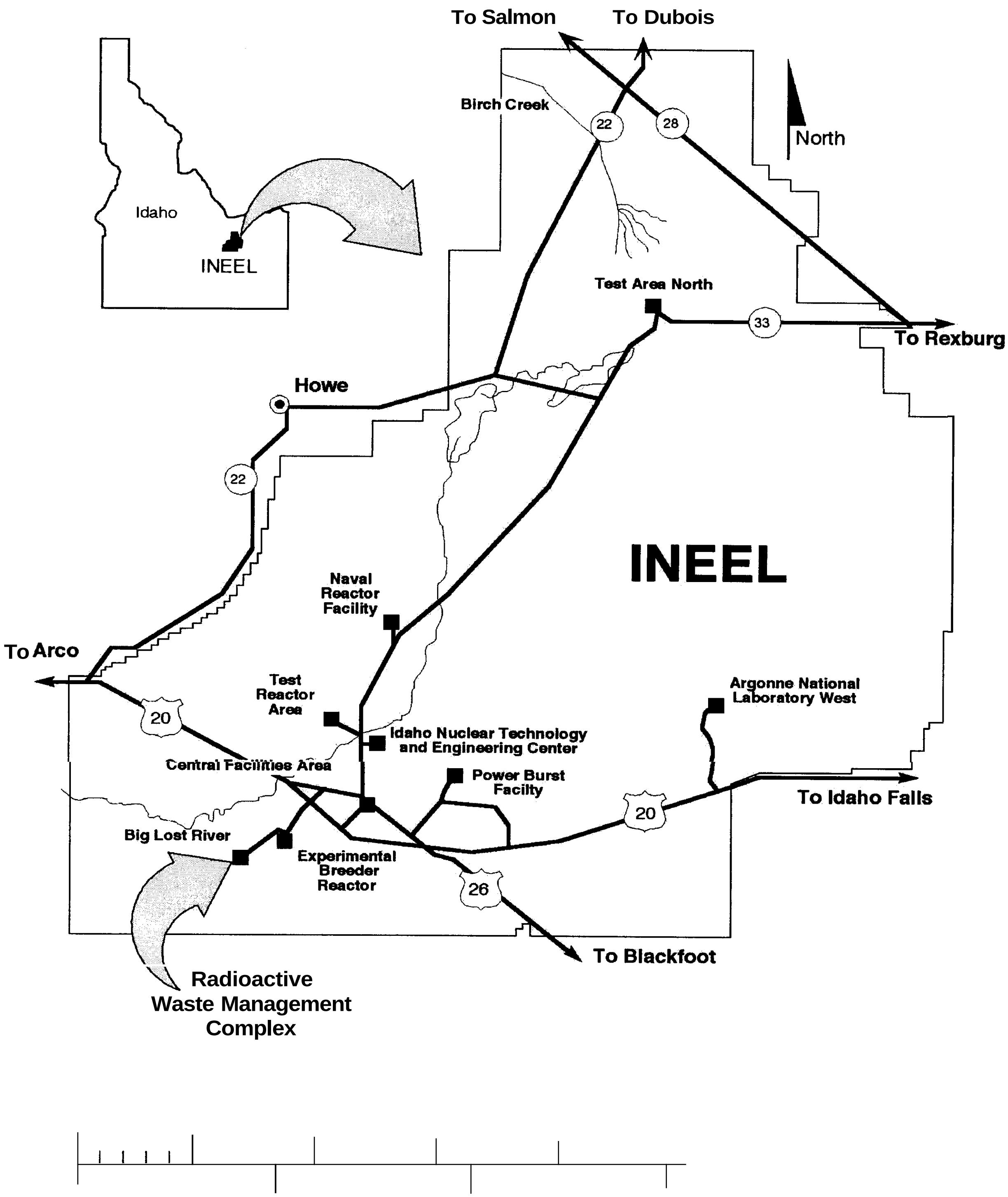

Figure 1-1. Map of the Idaho National Engineering and Environmental Laboratory Site.

production, waste management technology development, and energy technology and conservation programs. The DOE Idaho Operations Office (DOE-ID) has responsibility for the INEEL, and designates authority to operate the INEEL to government contractors. Bechtel BWXT Idaho, LLC, the current primary contractor for DOE-ID at the INEEL, provides managing and operating services to the majority of INEEL facilities.

A Consent Order and Compliance Agreement (COCA) was entered into between DOE and the EPA pursuant to RCRA, Section 3008(h), in August 1987 (DOE-ID 1987). The COCA required DOE to conduct an initial assessment and screening of all solid waste and hazardous waste disposal units at the INEEL and set up a process to conduct any necessary corrective actions. On July 14, 1989, the INEEL was proposed for listing on the National Priorities List (NPL) (54 FR 29820). The listing was proposed by the EPA, under the authorities granted to the EPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986 (42 USC § 9601 et seq.). The final rule that listed the INEEL on the NPL was published on November 21, 1989 (54 FR 48184). As a result of having the INEEL on the NPL list, DOE, EPA, and the Idaho Department of Health and Welfare entered into the Federal Facility Agreement and Consent Order (FFA/CO) on December 9, 1991 (DOE-ID 1991).

Under the FFNCO, the INEEL is divided into 10 waste area groups (WAGs). The WAGs are further subdivided into OUs. The RWMC has been designated WAG 7 and consists of 14 OUs. Operable Unit 7-13/14 is the combined scope and schedule for the OU 7-13 TRU pits and trenches RI/FS and the OU 7-14 comprehensive RYFS for WAG 7. Additional probing tasks may be performed at the OU 7-10 staged interim action (SIA) project (i.e., Pit 9) site under this HASP.

1.2 Radioactive Waste Management Complex Site Description

The RWMC was established in the early 1950s as a disposal site for solid, low-level waste (LLW) generated by INEEL operations. The RWMC is located in the southwestern portion of the INEEL, as shown in Figure 1-1. Within the RWMC is the SDA (35.6-ha [88-acre]) where radioactive waste materials have been buried in underground pits, trenches, soil vault rows, one aboveground pad (Pad A), and the TRU Storage Area (TSA), where interim storage TRU waste is kept in containers on asphalt pads. Transuranic waste was disposed in the SDA from 1952 to 1970. Rocky Flats Plant (RFP) TRU waste was received for disposal in the SDA from 1954 through 1970. The RFP is a DOE-owned facility located west of Denver, Colorado, that was used primarily for the production of components for nuclear weapons.

Subsurface monitoring at the RWMC, which determined whether radionuclides or other hazard contaminants had migrated into the subsurface, began in the early 1970s and is currently ongoing. Analytical results indicate that minute amounts of human-made radionuclides have migrated from the SDA toward the Snake River Plain Aquifer. An independent review of all analytical data from core drilling in the basalt below the SDA supports the conclusion that americium (Am)-241, cobalt (Co)-60, plutonium (Pu)-238, Pu-239, and Pu-240 are present in the clay/soil interbed sediments 33.5 m (110 ft) below the surface. The results of the data analyses do not support the presence of human-made radioisotopes either in the discontinuous interbed at 9.1 m (30 ft) below ground level, or the clay/soil interbed sediments at 73.2 m (240 ft) below ground level (Smith and Kudera 1996).

The major studies used to develop the RI/FS rationale for WAG 7 are summarized in the WAG 7 RI/FS Work Plan (Becker et al. 1996). A description of each OU within WAG 7 includes a summary of the FFA/CO assessments (DOE-ID 1991) using Track 1, Track 2, RWS, and interim action methodologies. The WAG 7 data gaps and their associated resolutions are also tabulated. Historical investigations also are referenced and summarized in the Interim Risk Assessment (IRA) report (Becker et al. 1998).

1.3 Task Site Description

The ***Addendum to the Work Plan for the Operable Unit 7-13/14 Waste Area Group 7 Comprehensive Remedial*** *Investigation/Feasibility* ***Study*** (DOE-ID 1998) selected earthen waste disposal Pits 4 and 10 as the principle locations to install and log cased probeholes (Type A) (see Figure 1-2). The Addendum also included collecting samples from Type-B probes (instrumented probes). Based on inventory record reports, shipping manifests, and disposal records, these are the most probable locations of contaminants of potential concerns (COPC) associated with RFP waste and sludge (DOE-ID 1998). Pit 6 was chosen as an alternative location for these activities. Therefore, this HASP includes Pit 6 as one of the OU 7-13/14 integrated probing task sites. Pit 6 will be investigated only if insufficient data are collected from Pits 4 and 10. In addition, this HASP also addresses OU 7-10 (Pit 9) probing.

Historical records and the average 1.53-km (5,010-ft) surface elevation inside the SDA were used to estimate the depths to basalt for the SDA. The depths to basalt inside Pits 4, 6, and 10 were estimated to range from 3 to more than 5.5 m (10 to more than 18 ft) (DOE-ID 1998). The periods of operation, surface areas, volumes, and approximate depth to basalt for the selected pits are given in Table 1-1.

Initially, each pit was excavated to the basalt bedrock, and approximately 1.1 m (3.5 ft) of soil was placed on the bedrock before the waste was placed into the pit. While these pits were operational, drums and boxes were generally dumped in the pits by truck or bulldozer and large items were placed in by crane. Soil cover was applied over the waste after daily or weekly operations, depending on the required procedures at the time of disposal. After the waste was placed in a pit, the pit was backfilled with another layer of soil. It is believed that approximately 1.8 m (6 ft) of clean soil overburden is located on top of the buried waste.

The inventory of contaminants in these pits is based on available shipping records, process knowledge, written correspondence, and the Radioactive Waste Management Information System (RWMIS). The east end of Pit 4 has the highest organic vapor concentrations based on soil gas survey data (EG&G 1992). A review of the shipping records indicates that over 10 shipments of 740-series RFP sludge, totaling 600 drums, were disposed of in the east end of Pit 4. Pit 6 also received 740-series RFP sludge.

The waste in Pit 9 is primarily TRU waste (>10 nCi/g) generated at the RFP, with additional LLW and other miscellaneous waste from generators at the INEEL (DOE-ID 1998). Approximately 3,115 m^3 (110,000 ft^3) of the waste buried in Pit 9 was generated at the RFP and consisted of (1) drums of sludge (contaminated with a mixture of TRU elements and organic solvents), (2) drums of assorted solid waste, and (3) wooden/cardboard boxes containing empty contaminated drums. Buried at the site were (1) 3,937 drum containers, (2) 2,452 boxes (of which 1,471 boxes contain empty contaminated drums), and (3) 72 unspecified containers of waste (DOE-ID 1993). The boxes were generally disposed at the north end of the pit and the drums were generally dumped in the south end, although intermixing of containers in the pit did occur as a result of pit flooding in 1969.

Pit-10 documentation contains the most inclusive shipping records of the selected pits. The records indicate that approximately 500 drums containing 740-series sludge from RFP were shipped between September 18, 1968, and October 18, 1968. The burial location of these 740-series drums in Pit 10 also corresponds to the lowest area of soil gas concentrations in the pit. Pit 10 was selected as the ideal pit for these activities because of the potential presence of first 741- and second 742-stage sludges from RFP.

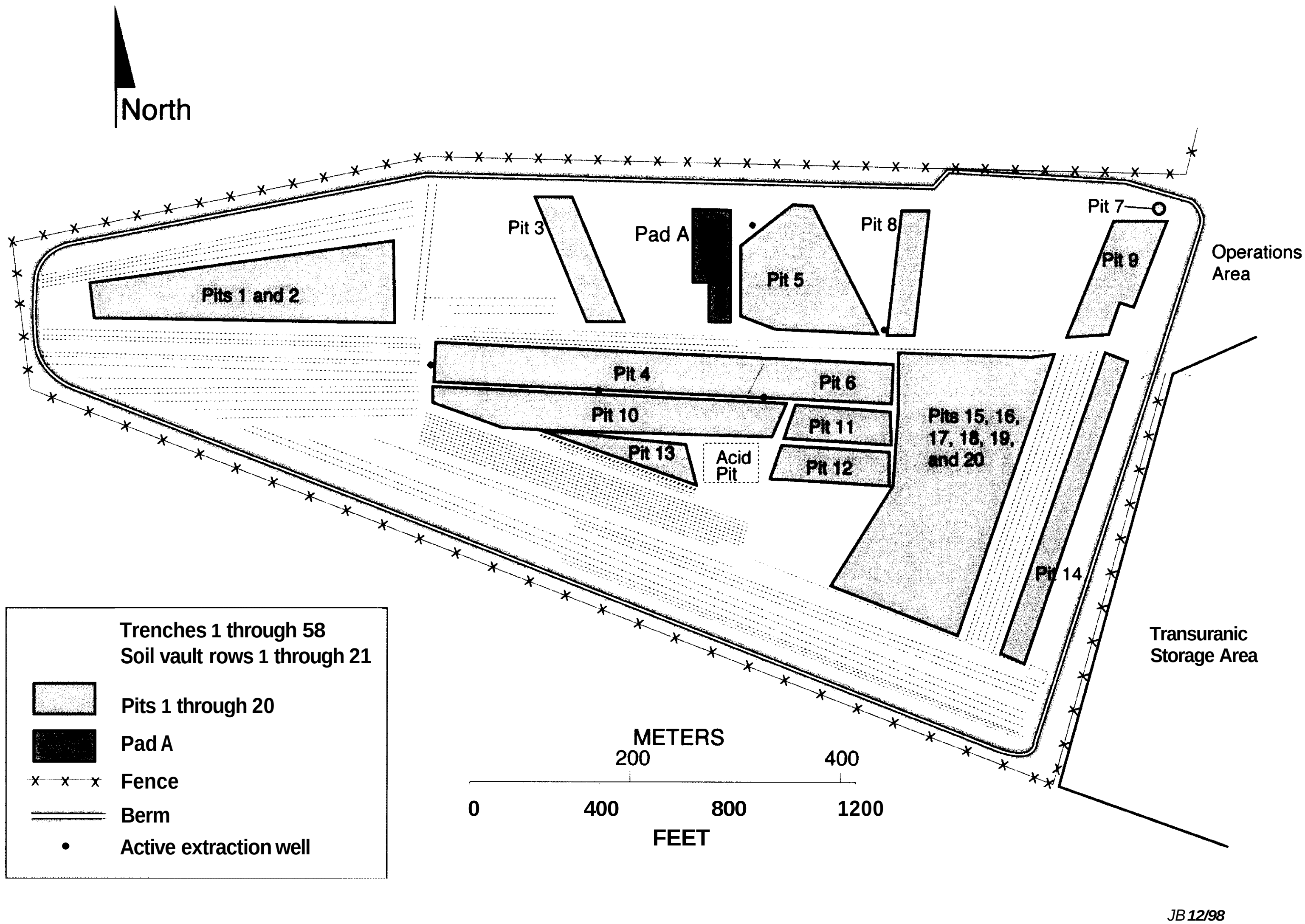

Figure 1-2. Map of the Subsurface Disposal Area (Pits 4, 6, 9 and 10) at the Radioactive Waste Management Complex.

Table 1-1. Specifications for selected pits.

Pit	Period of Operation (Approximate)	Surface Area[a] (ft^2)	Volume[a] (ft^3)	Depth (ft) to Basalt (Approximate)
4	January 1963–September 1967	111,732	1,581,284	10 to 18
6	May 1967–October 1968	54,984	780,773	10 to 18
9	November 1967–June 1969	43,560	750,000	10 to 20
10	June 1968–July 1971	111,732	1,586,594	10 to 18

a. Becker et al., August 1998, *Interim Risk Assessment and Contaminant Screening for the Waste Area Group 7 Remedial Investigation.*

Records indicate that only about 12% of the total sludge shipped contained series 743 sludges. Pit 10 also received two shipments containing over 4.5 t (5 tons) (i.e., 1.6 Ci) of depleted uranium. Two co-located shipments of Pu/Am, both with high Pu content and a high density for the Pu disposed (Ci/total volume), are located in Pit 10. Shipping records indicate a total of 58,954 g (130 lb) of Pu (i.e., 3,661 g [8 lb] Ci) and 5,072 g (11 lb) of Am (i.e., 17,280 Ci) disposed of in Pit 10.

The TRU radionuclides Pu-238, Pu-239, Pu-240, Pu-241, Am-241, and neptunium (Np)-237 compose 99.9% of the radioactivity originally buried in Pits 4, 6, and 10. Also present are the following uranium and thorium isotopes: U-234, U-235, U-236, U-238, and Th-234. Other categories of radionuclides buried in pits are mixed activation products (MAPs) and mixed fission products (MFPs). Cobalt-60 is the MAP of concern, and barium (Ba)-137, cesium (Cs)-137, strontium (Sr)-90, and yttrium (Y)-90 are the *MFPs* of concern. A summary of the radiological inventory is listed on Table 1-2 and discussed further in the Hazard Assessment (Section 8) of this HASP. This inventory is not decay corrected.

Sludge drums buried in Pits 4, 6, 9, and 10 contributed organic (e.g., carbon tetrachloride) and inorganic compounds to their contents. A summary of organic and inorganic constituents is listed in Table 8-3 and discussed further in Section 8. This information on waste constituents describes the nature of the waste when it was buried in Pits 4, 6, 9, and 10. No account is made for any damage or deterioration of the waste containers and their contents, decomposition of organic material, or mixing of container contents that may have occurred after the pits were closed.

1.4 Scope of Work

The OU 7-13/14 integrated probing activities will be performed to obtain material for analyses to fulfill WAG 7 RI/FS data gaps addressed in the Work ***Plan for Operable Unit 7-13/14 Waste Area Group 7 Comprehensive Remedial Investigation/Feasibility Study*** (Becker et al. 1996) and to meet the objectives of the ***Operable Unit 7-13/14 Plan for the Installation, Logging, and Monitoring of Probeholes in the Subsurface Disposal Area*** (INEEL 2000c). Several activities will be completed during this portion of this project. Principal activities include the following:

- Site preparation and mobilization
- Surface geophysical mapping
- Probehole installation (Types A and B)

Table 2-1. Activity for Pits 4, 6, 9, and 10 radiological inventory.[a]

Isotope	Estimated Activity in Pit 4 (Ci)	Corresponding Mass (g)	Estimated Activity in Pit 6 (Ci)	Corresponding Mass (g)	Estimated Activity in Pit 9 (Ci)	Corresponding Mass (g)	Estimated Activity in Pit 10 (Ci)	Corresponding Mass (g)
U-234	3.18E-00	5.14E+02	1.31E-00	2.12E+04	8.23E-02	1.32E+01	6.17E-00	9.97E+02
U-235	4.99E-01	2.33E+05	7.32E-02	3.42E+04	3.75E-03	1.73E+03	4.44E-01	2.07E+05
U-238	6.47E-00	1.94E+07	2.94E-00	8.83E+06	3.97E+00	1.18E+07	8.44E-00	2.53E+07
Pu-238	4.33E+02	2.51E+01	4.74E+01	2.59E+00	2.44E+01	1.49E+00	1.75E+02	1.02E+01
Pu-239	9.51E+03	1.52E+05	1.58E+03	2.53E+04	1.16E+03	1.87E+04	5.69E+03	9.10E+04
Pu-240	2.19E+03	9.46E+03	3.53E+02	1.55E+03	2.65E+02	1.17E+03	1.27E+03	5.59E+03
Pu-241	5.72E+04	5.72E+02	9.53E+03	9.53E+01	2.93E+03	2.84E+01	3.49E+04	3.49E+02
Pu-242	1.31E-02	3.33E+00	2.14E-02	5.43E+00	1.26E-02	3.20E+00	7.68E-02	1.95E+01
Am-241	2.2E+04	6.39E+03	3.66E+03	1.06E+03	2.26E+03	6.59E+02	1.33E+04	3.86E+03
Np-237	1.31E-01	1.86E+02	1.38E-02	1.96E+01	---	---	1.76E-01	2.49E+02
Co-60	1.25E+05	1.10E+02	3.42E+04	3.02E+01	5.11E-04	4.52E-07	2.25E+05	1.99E+02
Cs-137 (MAP)[b]	2.8E+04	3.24E+02	5.93E+03	6.85E+01	2.57E+00	2.97E-02	3.98E+04	4.60E+02
Sr-90 (MFP)[c]	1.7E+04	1.22E+02	5.52E+03	3.97E+01	2.33E+00	1.68E-02	1.84E+04	1.32E+02
Y-90 (MFP)[c]	1.13E+03	2.08E-03	1.23E+03	2.26E-03	2.33E+00	4.29E-06	4.37E+03	8.04E-03

a. B. H. Becker, 1998 correspondence. This inventory is not decay corrected.
b. MAPs = mixed activation products.
c. MFPs = mixed fission products.

- Downhole logging
- Sampling of Type-B probes, packaging, and shipping samples
- Periodic monitoring of Type-B probes
- Site and probe maintenance.

There are five target areas of interest, two in Pit **4** and three in Pit **10.** Information from soil gas surveys and surface geophysical mapping of Pits **4** and **10** will be used in conjunction with downhole logging data to determine the final probehole Type A and B locations. Soil gas surveys conducted in support of the OU **7-08** Organic Concentration in the Vadose Zone (OCVZ) Project will be used to identify areas of elevated organic vapor concentrations in the overburden soils. Surface geophysical mapping will be conducted to determine waste zone boundaries and to distinguish large discrete objects and collections of smaller objects within individual target waste zones.

Probeholes will be installed in targeted waste zones in Pits **4** and **10,** as described in the OU **7-13/14** plan for the installation, logging, and monitoring of probeholes in the SDA (see Figure **1-3).** Initial probes at the OU **7-10** site were installed in accordance with the Work ***Plan for Stage I of the Operable Unit 7-10 Contingency Project*** (DOE-ID **1998).** Additional OU **7-10** probing activities may be addressed in the OU **7-13/14** plan (Becker et al. **1996).** Downhole logging activities include gamma logs and radiological profiles that will be used to site the Type B sample locations. As stated previously, Pit 6 will only be investigated if deemed necessary. The original intent of the OU **7-10/13/14** probing efforts were to determine locations from which to retrieve core material from the waste and to install instruments into the coreholes. Delays and cost increases to implement the coring program in OU **7-10** has led OU **7-13/14** to investigate other means to collect the required data. Data will be collected using Type B instrumented probes.

The same sonic drill rig, remote control trailer, drilling materials, and personnel (to the extent possible) will used for all integrated probing project tasks at OU **7-10** and **OU 7-13/14** locations. **OU 7-13/14** integrated probing activities will be conducted in accordance with the ***Operable Unit 7-13/14 Plan for the Installation, Logging, and Monitoring of Probeholes in the SDA.*** The RWMC and OU **7-13/14** have established an interface agreement **(IAG-13)** that delineates **OU 7-13/14** project and RWMC roles and responsibilities for project activities.

1.4.1 Operable Unit 7-10/13/14 Drilling and Downhole Logging Lessons Learned

The OU **7-10/13/14** field team has conducted extensive probe installation and logging in Pits **4, 9,** and **10.** Procedures and work control documents have been updated to capture lessons learned and changing requirements. These lessons learned have been documented during post-job briefings captured in this HASP, and will be discussed during training of new personnel. Section **4** of this HASP discusses training further. Lessons learned from Type-B probe installation and sampling will be documented and discussed during daily plan-of-the-day (POD) meetings and in accordance with management control procedure (MCP)-3003, "Performing Pre-Job Briefings and Post-Job Reviews."

1.4.2 Site Preparation and Mobilization

Before project personnel initiate probing mobilization activities, they will all receive project-specific training as described in Section **4** of this HASP. Training requirements will be based on the nature of work to be performed and location of this work (required zone access). In addition, all personnel performing work inside the exclusion zone (EZ) will be required to meet the internal dosimetry

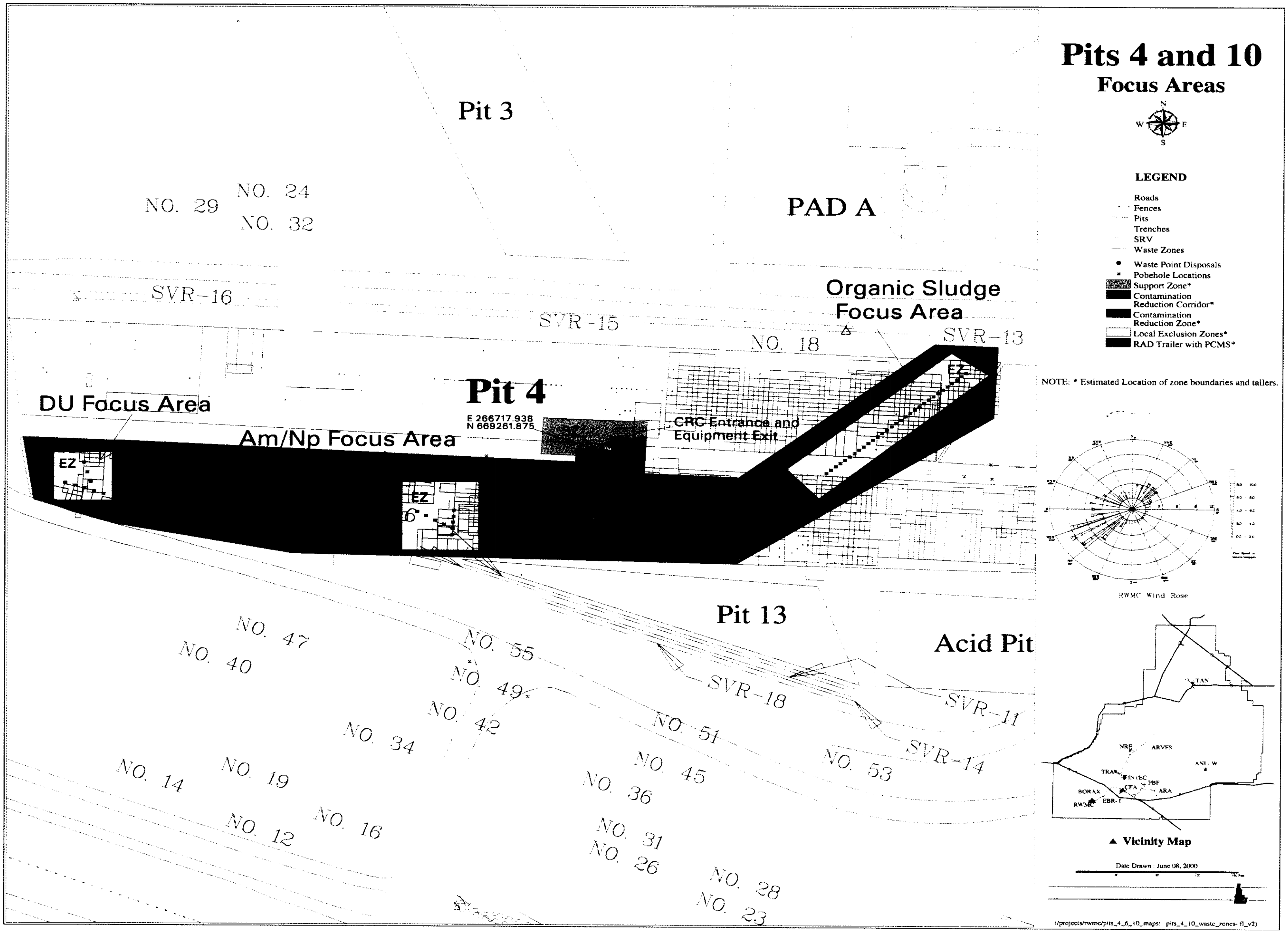

Figure 1-3. General locations for Type A probeholes in Pits 4 and 10 of the Subsurface Disposal Area

requirements identified in Section 5 of this HASP. All site preparation and mobilization tasks at the OU 7-13/14 integrated probing sites will be conducted in accordance with technical procedure requirement (TPR)-154, "Operational Support Activities."

Mobilization of equipment will consist of moving the drill rig, control trailer, and drilling support materials to the OU 7-10/13/14 integrated probing project site. The only intrusive tasks that will occur during site preparation and mobilization will be to anchor trailers and establish zones and designated work areas, using posts. A section of geomembrane around the probe installation location will serve as an all-weather working surface and a barrier between the overburden soil and all equipment and personnel. The geomembrane also provides a solid surface to collect radiological contamination swipes and conduct surveys. Site boundaries or "zones" will be established to ensure that project and nonproject personnel are aware of restricted and potential hazard areas. Section 7 of this HASP describes these zones in detail. Operable Unit 7-13/14 probing personnel will enter the RWMC through existing main gates (by main guard gate Waste Management Facility building [WMF]-637). Access and egress from the specific project site **EZ** will be through the radiological control (RadCon) trailer and specified entry control points.

The RadCon trailer will be located within the SDA, adjacent to the OU 7-13/14 probing task site area. The RWMC RadCon office (WMF-601) may serve as an alternate location. Prior to driving any anchors, an outage request/excavation permit will be obtained from the RWMC outage coordinator if project trailers are placed and anchored in the support zone **(SZ)** (Figure 7-1). Trailers serve as a project meeting area, radiological survey station (when exiting contamination reduction corridor), and instrument storage/calibration areas. The RadCon trailer will include mobile communication equipment, such as hand-held radios and a mobile phone. The WMF-657 trailer will be equipped with other administrative support equipment for integrated probing activities. All work will be conducted in accordance with MCP-3562, "Hazard Identification, Analysis and Control of Operational Activities," RWMC work control processes, or **INEEL** Standard (STD)-101, "Integrated Work Control Processes."

Electrical power is supplied to the OU 7-13/14 integrated probing sites via a mining cable and series of transformers and power junction boxes located in the SDA. If additional power resources are required, interruption of existing facilities or electrical services will be arranged with RWMC management, power management, or other applicable personnel and organizations. Additional service activities may include modifying existing roadways, ditches, electrical transmission lines and hookups, fencing, and culverts to permit personnel and equipment access through the RWMC to the OU 7-13/14 integrated probing sites.

All changes to existing drainage systems and roadways will be coordinated through the RWMC, and appropriate changes made to existing INEEL and RWMC environmental plans (e.g., RWMC Storm Water Plan). Fire protection resources and water will be supplied for probehole activities with mobile equipment. The project fire protection engineer will assess the need for additional fire protection resources. The nearest source of extinguishing water (fire hydrant DM-04) is located outside the SDA, approximately 30 m (100 ft) southeast of the OU 7-10 SIA project (i.e., Pit 9).

1.4.3 Evaluation of Existing Data

The strategy used to select locations for Type-B probes and treatability studies began with the available historical shipping and disposal records, previously collected geophysical data, and additional data from volatile organic compound (VOC) mapping to identify areas of interest and potential for high gamma radiation fields in Pits 4 and 10. This included geophysical logging data from installed Type A probes and soil gas data.

Shallow soil gas surveys have been performed on a gridded pattern within Pits 4 and 10 in support of the OU 7-08 OCVZ project to aid in the site selection of the Type-B probeholes and to increase the likelihood of obtaining RFP sludge that contain VOCs. Active soil vapor surveys have been conducted in the subsurface to locate significant masses of chlorinated hydrocarbons that are associated with RFP sludge and other organic waste streams. The soil gas survey has been conducted using active air extraction methods for sampling from shallow drive points. Air samples of the drive points were collected using Tedlar bags and analyzed for chlorinated hydrocarbons. Results are being provided to the OU 7-13/14 integrated probehole PM as they become available.

1.4.4 Surface Geophysical Mapping

Surface geophysical mapping was performed to define waste zone boundaries more accurately. The data provided some control on the distribution of waste in the x- and y- plane, which will complement z-component information obtained from geophysical logging. A suite of high-resolution geophysical surveys, including magnetic field, time domain electromagnetic induction, frequency domain electromagnetic induction, and seismic refraction, have been performed and were used in the selection of Types A and B probes identified in the ***Operable Unit 7-13/14 Plan for the Installation, Logging, and Monitoring of Probeholes in the Subsurface Disposal Area.***

1.4.5 Installation of Cased Types A and B Probes

Waste disposal records have been used to site probehole locations and have been supplemented with soil gas surveys and surface geophysical mapping data. Type A (large diameter) probes are being installed to allow for geophysical logging tasks, while Type B (instrumented) probes will be installed to support the WAG 7 RI/FS by allowing monitoring and sampling of the waste region. The exact location of the Type-B probes will be determined following logging of the Type A probes. All probes will be installed through targeted waste zones as described in the ***Operable Unit 7-13/14 Plan for the Installation, Logging, and Monitoring of Probeholes in the Subsurface Disposal Area.***

Type A probing activities will be conducted in accordance with TPR-1760, "Probehole Installation." Type-B probes will be installed in accordance with TPR-1672, "Type B Probe Installation" and TPR 1673, "Type B Visual Probe Installation." Type-B probes will be sampled following the "Field Sampling Plan for Monitoring of Type-B Probes in Support of the Integrated Probing Project Operable Unit 7-13/14 (Draft)" (Salomon 2001). Probes shall be driven to allow for maximum advancement with the least disturbance to subsurface soils. The drill rig will be remotely operated from a control trailer and unsheltered field workers (e.g., drill helpers, radiological control technicians [RCTs]), and industrial hygienists [HIs]) will be a minimum of 15 m (50 ft) from the drill string during probing tasks, in accordance with TPRs-1760, -1672, and -1673.

Video cameras will be mounted on the drill rig to enable the operator to visually view the drill rig on monitors positioned in the control trailer. Direct communication with the drill helpers, RadCon personnel, and the FTL will be achieved using the radio communication base station and individual headsets. All radio communication will be clear and concise, as required by MCP-2976, "Chapter IV, Operations Communications."

1.4.5.1 Type A Probes. The installed probehole casing will be 12 cm (5 in.) inside diameter (i.d.) of high-carbon steel and have a disposable point or truncated point to advance the probehole. Probeholes will be installed through the overburden, waste, and underburden to the top of basalt (a depth estimated to range from 3 m to more than 5.5 m [10 ft to more than 18 ft]) and be left in place and completed with a threaded plug until the downhole logging tasks are completed. If a probehole must be abandoned due to refusal, an additional probehole may be installed in a nearby location, in accordance with the restrictions and technical safety requirements (TSRs) identified in TPR-1760. The proximity of probeholes will be limited to 1.5 m *(5 ft)* edge-to-edge unless probeholes are completed with sand, or equivalent material, or other methods approved by the project criticality safety engineer in accordance with the current TSR requirements. As previously mentioned, Pit 6 is only included as a contingency pit and most likely will not be investigated. The following three general focus areas will be investigated during this phase of the OU 7-13/14 probehole investigation:

- Depleted uranium
- Organic sludge focus area (743-series sludge)
- **Am/Np** focus area (741-series sludge).

Additional focus areas or SDA locations may be selected based on downhole logging results or Type-B probe sampling data.

1.4.6 Downhole Logging

Following Type A probe installation, downhole logging tasks will be conducted to further define RFP waste and sludge zones of interest for locating Type-B probes. Probehole logging will be performed to investigate waste conditions as a function of depth. These activities will be conducted in accordance with **INEEL** Plan (PLN)-493, "Downhole Logging" and approved logging procedures or existing STD-101 work package. Logging data is also being used to select additional Type A locations.

Nuclear logging methods are further described in Subsection 4.3.1.2 of the ***Addendum to the Work Plan for the Operable Unit 7-13/14 Waste Area Group 7 Comprehensive Remedial InvestigatiodFeasibility Study*** and ***Operable Unit 7-13/14 Plan for the Installation, Logging, and Monitoring of Probeholes in the Subsurface Disposal Area.*** Additional logging techniques associated with the advance borehole probe development project may be utilized in OU 7-13/14 integrated probing project locations. This would involve the use of a neutron generating device and detector to quantify specific waste constituents. All neutron generator tasks will be conducted in accordance with MCP-138, "Control And Registration of Radiation-Generating Devices."

Probehole threaded plugs will be removed and the selected logging tool positioned over the probehole with the logging truck hydraulic arm or a tripod/sheave assembly (if the logging truck hydraulic arm cannot be positioned directly over the probehole). The selected tool will then be lowered using the logging truck winch system at the desired rate to obtain data from the detector. When each probehole has been logged, the tool will be raised and surveyed for contamination (as deemed appropriate by RadCon). After the logging tool is completely removed, the probehole threaded-plug will be placed back on the cased probehole.

The logging vehicle and an assortment of tools and detectors will be used to log installed, cased probeholes as described above. Tools to be used will consist of both active and passive detectors. The neutron source for activated logging tasks may consist of a sealed source. Additionally, a verification source may be used daily as part of the overall logging calibration and quality control process. The MCP-137, "Radioactive Source Accountability and Control," will be followed for all source handling and storage operations. If any sealed source is determined to be special nuclear material, it will be handled and stored accordingly. An RWMC RadCon representative, or designated project personnel, will serve as the source custodian when it is not in use. All radioactive sources will be shipped in accordance with 49 CFR 171 through 177.

Direct communication between the logger, logging technician, FTL, and support personnel will be achieved using direct verbal communication (when possible), radio communication, or hand signals. All communication will be clear and concise, as required by MCP-2976, "Chapter IV, Operations Communications."

1.4.6.1 Type-B Probes. Six types of instrumented (Type B) probes have been proposed for installation in the SDA. These are the following:

- Vaporports
- Tensiometers
- Moisture probes
- Lysimeters
- Visualprobes
- pH, oxidation reduction potential probes (geochemical probes

Two documents, ***Operable Unit 7-13/14 Plan for the Installation, Logging, and Monitoring of Probeholes in the Subsurface Disposal Area*** and the ***Field Sampling Plan for Monitoring of Type-B Probes in Support of the Integrated Probing Project Operable Unit 7-13/14,*** contain **(1)** a detailed description of each Type-B probe, (2) instrument capabilities, **(3)** the strategy used to select the location, number, and depth of instruments, **(4)** the construction of the instruments, ***(5)*** the installation of the instruments, and (6) the strategy to determine the sampling frequency.

Type B instrumented probehole activities will be performed following the review of results from Type A probing and soil gas surveys. Planning for the Type B probing is primarily for Pits **4** and **10.** However, as a direct result of the principal study questions, some locations inside the SDA, other than in Pits **4** and **10,** may also have instrumented probes installed. Other potential locations may address **(1)** an additional, suspected, depleted uranium source in Pit ***5,*** (2) activated metal source of **C-14** in soil vault row **17,** and **(3)** possibly a beryllium reflector block disposal location in soil vault Row 20. Additionally, Type-B probes may be installed in Pit 9. Figure **1-4** provides an illustration of Type-B probe clustering.

The exact location of the Type-B probes will be based on the final results of Type A probing and logging and provided in the ***Field Sampling Plan for Monitoring of Type-B Probes in Support of the Integrated Probing Project Operable Unit 7-13/14.*** Installation, sampling, and monitoring technical procedures will be used for all Type B activities.

1.4.6.2 Type B Probe Sampling. Type-B probes installed in and near SDA waste locations will be used to gather data to support the OU **7-13/14** RI/FS. The data generated by the probing and monitoring will be used to **(1)** refine model parameters, (2) reduce the uncertainties associated with risk estimates for riskdriving contaminants, **(3)** provide data to support OU **7-13/14** treatability studies, and **(4)** support evaluation of OCVZ alternatives. Sample data will be collected from each of the Type-B probes as described below, and in accordance ***Field Sampling Plan for Monitoring of Type B Probes in Support of the Integrated Probing Project Operable Unit 7-13/14.***

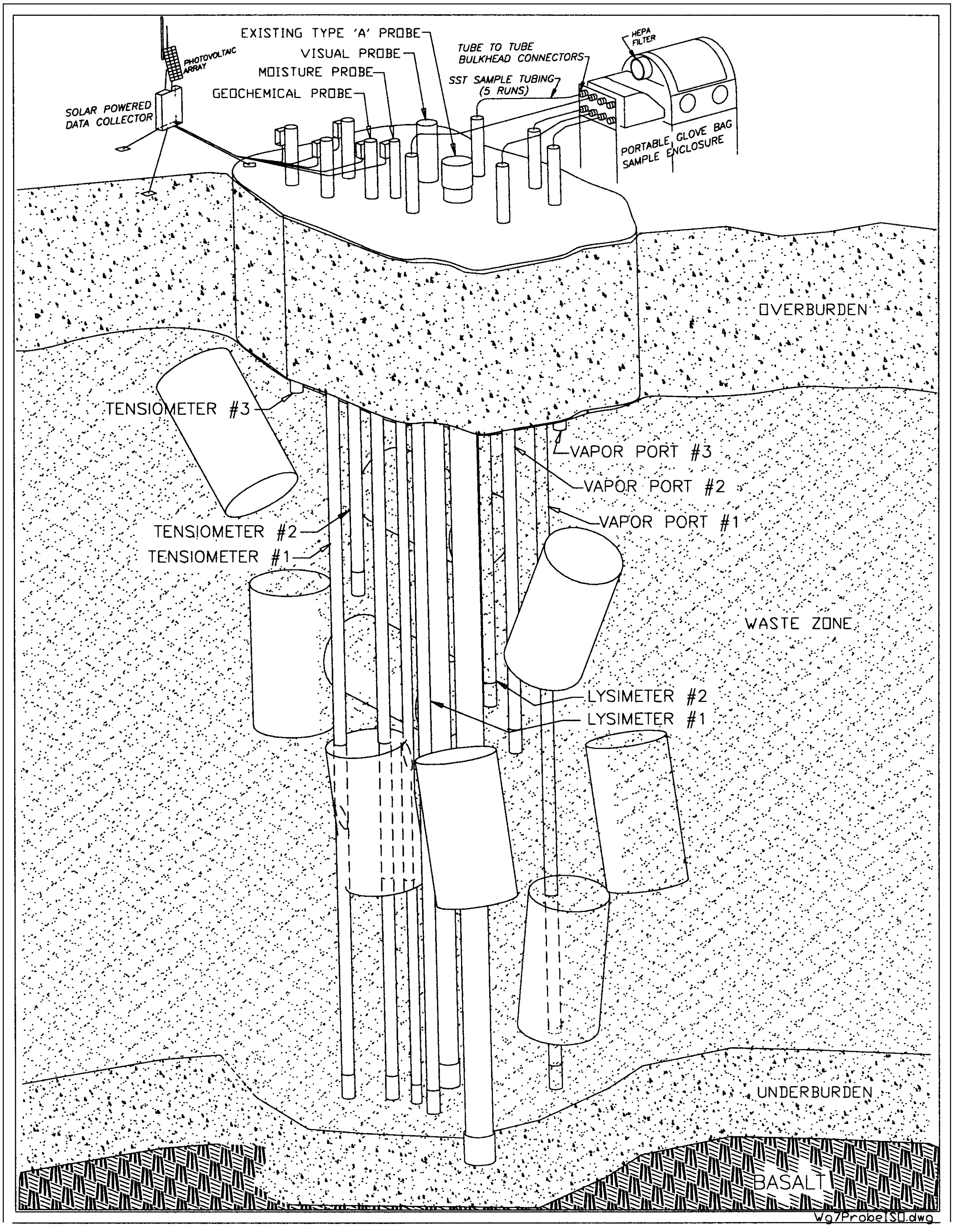

Figure 1-4. General placement of Type-B probe clusters.

1.4.6.2.1 Vapor Ports—Commercially available vapor ports are being used to sample soil gas from the waste zones and area surrounding the soil vaults in the SDA. Soil gas is collected through a small, porous section of a rod attached directly behind a drive tip. The probe is pushed into place and will be left as a permanent installation. Soil gas samples are transported to ground surface, through tubing inside the rod, by applying a vacuum to the tube. After installation, the sample tube is terminated at ground surface with a fitting so the port can be accessed. Engineering Design File (EDF)-ER-235, "OU 7-13/14 Vapor Port Probe Design," describes the specifications to install vapor ports, as for this investigation.

1.4.6.2.2 Tensiometers — A push tensiometer is a long, cylindrical tube with a porous stainless steel section, connected to a drive point at the bottom, for penetration through the soil and waste. A tube connects to the porous steel section and allows access at the surface. Water is poured down the access tube into and above the porous cup. A pressure transducer is located above the water reservoir.

When the tensiometer is placed in unsaturated soil, water in the tensiometer equilibrates with the soil water in the surrounding medium. During equilibration (which may require several days), water will be drawn from the tensiometer into the surrounding formation and a change in pressure head will occur in the tensiometer. The pressure transducer will measure the vacuum in the air/water column within the tensiometer (which is in equilibrium with the surrounding medium) to determine the matric potential of the surrounding medium.

1.4.6.2.3 Moisture ***Probes***— The soil moisture probe indirectly measures the moisture content of soils by using the relationship between the soil dielectric constant and the moisture content. The soil moisture probe is connected to a data logger, using a wire lead, where measurements are stored and downloaded periodically. The tube is sealed so there is no pathway from the sensing element to land surface. Only the data logger will be accessed for downloading. Engineering Design File, EDF-ER-234, "OU 7-13/14 Soil Moisture Probe Design," describes the specifications of the soil moisture probes installed for this investigation.

1.4.6.2.4 Lysimeters — Suction lysimeters are designed to collect soil water samples under either saturated or unsaturated conditions. To collect water, a partial vacuum is applied on the porous section of the lysimeter (porous stainless steel with a 0.2-micron pore size) that is in contact with the soil, and soil water is drawn into the lysimeter body. Water is removed from the suction lysimeter by applying positive pressure to the suction lysimeter, which pushes the collected water up a tube to the surface and into a sample container. The amount of water collected and duration of collection is dependent on the available soil moisture, soil water potential, the conductivity of the porous material in the lysimeter, and the vacuum applied.

The push suction lysimeter used for the integrated probing project will be approximately 5 cm (2 in.) in diameter. The outside portion of the push suction lysimeter will be the same as the push tensiometer and will consist of a long, cylindrical tube with a porous stainless steel section, attached to a drive point at the bottom, for penetration through the soil and waste. A pipe connects to the porous steel section and provides a conduit and protection for air and water lines that extend to the surface. The water line extends from the bottom of the lysimeter point to the surface. The airline is above the water reservoir, and also extends to the surface. To operate the lysimeter, the water line is closed and a vacuum is applied to the lysimeter via the airline, which is then closed off by a valve. The lysimeter collects the soil water, decreasing the vacuum as water moves into the reservoir. Engineering Design File, EDF-ER-236, "OU 7-13/14 Lysimeter Probe Design," describes the construction and design specifications of the suction lysimeters installed for this investigation.

1.4.6.2.5 *Visual Probes*—Visual probes consist of Lexan tubes that allow visual logging devices (i.e., video cameras) to be lowered down through them to allow visual confirmations related to the environment in and beneath the waste zone. The Lexan tubes are resistant to chemical attack. Being able to visually inspect the tubes and their integrity allows the unique opportunity to monitor the status of the tubes and to plan to abandon them in place should they appear to be approaching failure. Engineering Design File, EDF-ER-237, "OU 7-13/14 Visual Probe Design," describes the construction and design specifications of the visual probes installed for this investigation.

1.4.6.2.6 Geochemical ***Probes*—**Geochemical probes will be used to monitor pH, oxidation-reduction potential, and temperature in the subsurface of the SDA. These probes are currently under development and will be addressed at a later date.

1.5 General Project Information

The OU 7-13/14 integrated probing project will involve a field team of five to 10 individuals (see Section 2, Figure 2-1). Project personnel will consist of the drilling team, sampling team, RadCon support (engineers and technicians), health and safety professionals (i.e., HSO, IH, safety professional [SP]), PM, and support personnel.

The current configuration of the project site will require the drill rig to be carefully moved to each location, due to existing structures and physical features (e.g., existing probes, fences, ditches, berm, roads). Every effort will be made to minimize the disturbance of adjacent structures and operations. Extensive planning during site preparation will lessen potential impact to ongoing RWMC and other SDA operations. Such planning activities may include the following:

- Prepare "National Environmental Policy Act" (NEPA) (42 USC § 4321 et seq.) documentation, including an environmental checklist
- Prepare the storm water pollution prevention plan
- Prepare work control documentation/integrated planning sheets
- Prepare a job safety analysis
- Prepare unreviewed safety questions
- Prepare a waste characterization report and forms L-0435, "Waste Management D&D/ER," for waste disposal, as necessary
- Prepare a fire hazards analysis based on a graded approach
- Conduct management self-assessments and other readiness assessment for select activities
- Prepare additional technical procedures
- Abide by MCP-2798, "Maintenance Work Control" (where appropriate).